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OCCUPATIONAL MATHEMATICS; PERCENTAGE. REPORT NO. 16-P. BOOKLET II. FINAL REPORT.

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This programed mathematics textbook (Volume II) is for student use in vocational education courses. It was developed as part of a programed series covering 21 mathematical competencies which were identified by university researchers through task analysis of several occupational clusters. The development of a sequential content structure was also based on these mathematics competencies. After completion of this program the student should be able to: (1) convert to a percentage from a fraction of the form a/b, where 0 is less than (a,b) and these are less than 1,000, (2) convert from a percent to a fraction, (3) convert from a decimal to a percentage, (4) convert from a percent to a decimal, and (5) solve percentage problems of the form A=% x Base for A, %, or Base given the other two factors. The material is to be used by individual students under teacher supervision. Twenty-six other programed texts and an introductory volume are available as VT 006 882-VT 006 909, and VT 006 975. (EM)

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BOOKLET 11

OF

Report No. 16-P

Occupational Mathematics

PERCENTAGE

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Welcome to Booklet #2. Let's continue by learning how to change fractions to per cents. This should be easy. All you do is change the fraction to a decimal (This is taught in Unit 12) and then you simply change that decimal into per cent notation like you did in Booklet #I of this Unit.

Try this problem.

9/10 = ___%.

(a)	9/10	Turn to page 122
(b)	9	Turn to page 138
(c)	90	Turn to page 119

Wait a minute!

A per cent must have a denominator of 100. Does 11/25 have a denominator of 100? Of course not.

Therefore, 11/25 <u>does</u> <u>not</u> equal 11%.

Go back to page 116 and give it another try.

Turn to page 116.

Correct!

Here's the next problem.

2/3 is equal to what per cent?

(a) 66.66% Turn to page 127

(b) .6667% Turn to page 135

(c) 66.67% Turn to page 155

Wrong answer. Let's see how the problem should be worked.

Step 1: 5/8 = .625 (change the fraction to a decimal)

Step 2: .625 = .625 x 100% = 62.5% (change the decimal to a per cent)

Step 3: 62.5% = 62 1/2% (which is our answer)

You work a problem now.

11/25 = ___%.

(a)	11	Turn to page 114
(b)	11/25	Turn to page 129
(c)	44	Turn to page 121

Okay! Now you are on the right track.

Let's work one more to make sure we really understand the process.

3/20 = ___%.

(a) 3 Turn to page 124

(b) 30 Turn to page 130

(c) 15 Turn to page 133

You are having trouble changing decimals to per cents.

Go to page 69 in Booklet #I and study the material there carefully. Then continue the Unit from there.

Your answer is correct!

Let's go on.

Write 5/8 as a per cent.

(a) 16% Turn to page 125

(b) 62 1/2% Turn to page 132

(c) 6 1/4% Turn to page 116

You seem to be having trouble.

Go to page 138 and read the explanation there carefully. Then continue from there.

Correct!

Here is another one for you.

What per cent is equal to 5/4?

(a) 1 1/4% Turn to page 137

(b) 125% Turn to page 132

(c) 80% Turn to page 128

Incorrect.

Let's look at how a problem is worked. 9/10 = .9. Therefore, we multiply by 100% and get 90% for our answer.

Another way to look at the problem is to change our fraction to an equivalent form with a denominator of 100. Then we just take the numerator and annex the per cent symbol. In other words, 9/10 = 90/100 = 90%.

Now you try one.

1/4 = ___%.

(a) 25 Turn to page 133

(b) .25 Turn to page 141

(c) 4 Turn to page 134

Your answer is incorrect.

Let's see how to work it.

Step 1: 10/11 = .90909090... (change to a decimal)

Step 2: .909090... x 100% = 90.9090...% (change to per cent notation)

Step 3: Then round off 90.9090...% to two decimal places which gives us the answer 90.91%.

Now you work one.

5/9 = ___%.

(a) 55.56% Turn to page 115

(b) .5556% Turn to page 131

Incorrect.

You must change 3/20 into a decimal or a fraction with a denominator of 100. Then change it into per cent notation.

Return to page 117 and use one of the methods I suggested. Turn to page 117.

Wrong answer. Let's see how the problem should be worked.

Step 1: 5/8 = .625 (change the fraction to a decimal)

Step 2: .625 = .625 x 100% = 62.5% (change the decimal to a per cent)

Step 3: 62.5% = 62 1/2% (which is our answer)

You work a problem now.

11/25 = ___%.

(a)	11	Turn to page 114
(b)	11/25	Turn to page 129
(c)	44	Turn to page 121

Whoa! 2/5 means 2 divided by 5.

Be careful now.

Write 1/2 as a per cent.

(a) 50% Turn to page 117

(b) 5% Turn to page 141

You forgot to round off your answer. Be more careful with your work.

Here is another problem for you to get you back on the right track.

2/7 = ___%.

(a) .2857 Turn to page 131

(b) 28.57 Turn to page 115

(c) 28.58 Turn to page 135

Whoa! 5/4 means 5 divided by 4.

Go back to page 121 and divide correctly this time.

Turn to page 121.

Incorrect.

You must change the fraction to either a decimal equivalent or a fractional equivalent with a denominator of 100. Look at this example:

$$11/25 = \frac{11 \times 4}{25 \times 4} = 44/100 = 44\%$$

OR

$$11/25 = 25/\overline{11.} = 25/\overline{11.00} = .44 \times 100\% = 44\%.$$

$$\begin{array}{r} .44 \\ 10\ 0 \\ \hline 1\ 00 \\ 1\ 00 \\ \hline \end{array}$$

Here's one for you.

9/50 = ___%.

(a) 18 Turn to page 121

(b) 9 Turn to page 120

You seem to be having trouble converting fractions to decimals.

Go review the concepts in Unit 12 and then return to page 113 in this booklet.

Go to Unit 12.

Incorrect.

You forgot to multiply by 100.

Be more careful now and work this problem.

2/9 written in per cent form is:

(a) 22.22% Turn to page 115

(b) 22.23% Turn to page 135

Good! That answer is correct.

Here is the next problem.

10/11 = ___%.

(a) 9.09 Turn to page 123

(b) 90.9 Turn to page 140

(c) 90.91 Turn to page 155

That's correct!

Let's continue.

Write 2/5 as a per cent.

(a)	40%	Turn to page 119
(b)	4%	Turn to page 141
(c)	2 1/2%	Turn to page 126

Whoa!

1/4 means 1 ÷ 4. Go back to page 138 and work the problem again.

Whoops! Forgot to multiply by 100%.

Try this problem.

What is 10/17 written in per cent notation?

(a) 58.83% Turn to page 139

(b) 5.88% Turn to page 118

(c) 58.82% Turn to page 115

Good! That's the right answer.

Work this one.

2% of 25 = ___%.

(a) .08 Turn to page 163

(b) .5 Turn to page 169

(c) 1.25 Turn to page 147

No. That is an incorrect answer.

Because $5/4 = \frac{5 \times 25}{4 \times 25} = 125/100 = 125\%$.

Try this one.

1/16 = ___%.

(a) 1/16 Turn to page 129

(b) 62 1/2 Turn to page 142

(c) 6 1/4 Turn to page 121

Incorrect. Let's look at how a problem is worked.

9/10 = .9. Therefore, we multiply by 100% and get 90% for our answer.

Another way to look at the problem is to change our fraction to an equivalent form with a denominator of 100. Then we just take the numerator and annex the per cent symbol. In other words, 9/10 = 90/100 = 90%.

Now you try one.

1/4 = ___%.

(a) 25 Turn to page 133

(b) .25 Turn to page 141

(c) 4 Turn to page 134

You are having trouble rounding off numbers to two decimal places.

Go to page 81 in Unit 11 and review the concept of rounding off. Then return to page 132 of this Unit.

Go to Unit 11, page 81.

Incorrect.

You didn't round off your answer correctly. Carry the division out <u>three</u> places and then round off your answer to two decimal places.

Return to page 132 and try the problem again.

Your answer is incorrect.

Remember, change to a decimal and then multiply by 100%.

EXAMPLE: 1/4 = .25 = .25 x 100% = 25%.

Here's a problem for you.

What per cent is equal to 1/10?

(a) 1% Turn to page 130

(b) 10% Turn to page 133

Whoops! Mislocated the decimal point.

Go back to page 137 and see if you can correct your mistake and get the correct answer.

Turn to page 137.

You're working this problem incorrectly.

Go to page 145 and read the explanation again. Then continue from there.

Turn to page 145.

Your answer is incorrect. Here is how the problem should have been worked.

Step 1: 1 2/9 = 1.22222... (change to decimal form)

Step 2: 1.2222... = 1.2222... x 100% = 122.2222...%
(changed the decimal to per cent notation)

Step 3: Rounded our per cent off to two decimal places and got an answer of 122.22%.

Try this problem.

What per cent is equal to 2 3/11?

(a) 22.73% Turn to page 149

(b) 227.27% Turn to page 153

(c) 2.27% Turn to page 150

Very good! You are doing well. This is the last section of this booklet and will cover solutions of problems involving percentage.

All percentage problems can be set up in equation form as "Amount = Percentage x Base," or in symbol form, A = % x B. You should notice that this form is really identical to the equation a = bc that can be studied in Units 13 and 14. All solutions of A = % x B will be arrived at by the same process that is used in Unit 14.

As for the actual working of the problems, you take the equation A = % x B and decide for what value you are solving. Whether: (a) $\frac{A}{}$ = % x B,

(b) $\frac{\%}{}$ = A/B

or (c) B = A/%. Then convert the per cent to a decimal (in equations a and c) and carry out the desired operation. In equation b above you would divide A by B and then convert that decimal to a per cent.

Okay, turn to page 146 and continue.

Okay, here is the next problem.

____ is 3% of 25.

(a) .75 Turn to page 169

(b) .0012 Turn to page 157

(c) 833 1/3 Turn to page 143

Your answer is incorrect.

The word "of" indicates multiplication. Going back to our general equation, "Amount = per cent x Base," we could write this as "Amount <u>is</u> percentage <u>of</u> Base."

Try another problem.

___ = 10% of 38.

(a) .38 Turn to page 156

(b) 380 Turn to page 163

(c) 3.8 Turn to page 136

Incorrect.

You failed to multiply by the number that changes any number into a per cent. What is that number? 100%, of course.

Here's the next problem, but be more careful this time.

6 2/11 = ___%.

(a) 18.18 Turn to page 151

(b) 618.18 Turn to page 153

(c) 61.82 Turn to page 150

Watch that decimal point! You placed it incorrectly.

Return to page 144 and try again.

Your answer was incorrect. Try to remember the steps we use in working this type of problem.

Step 1: Change the fraction to a decimal

Step 2: Change the decimal to a per cent by multiplying by 100 or moving the decimal point two places to the RIGHT.

Step 3: Round off your per cent to hundredths, if necessary.

EXAMPLE: 2 3/11 = 2.2727... = 2.2727... x 100% = 227.27%

Now work this problem.

4/3 = ___%.

(a) 133.33% Turn to page 153

(b) 13.33% Turn to page 159

Ooops! That answer isn't even close.

Go back to page 162 and concentrate on working it correctly. Turn to page 162.

Incorrect.

Go back to page 157 and read the explanation again. Read it over a couple times to make sure you have the idea. Then continue from there.

Turn to page 157.

Correct!

Here's your next problem.

What per cent is equal to 10 7/9?

(a)	10 7/9%	Turn to page 148
(b)	10.78%	Turn to page 162
(c)	1077.78%	Turn to page 145

Your answer is incorrect.

Go to page 177 for a deeper explanation of this type of problem. Turn to page 177.

Very good! You're moving right along.

Here is another problem for you to solve.

1 2/9 is equal to what per cent?

(a) 122 2/9% Turn to page 160

(b) 1.22% Turn to page 144

(c) 122.22% Turn to page 145

Incorrect. You misplaced the decimal point.

Let's try another one and see if we can get back on the right track.

What is 25% of 64?

(a) 2.56 Turn to page 163

(b) 16 Turn to page 136

(c) .39125 Turn to page 161

Your answer is incorrect.

In these problems you are solving for the "Amount" part of the equation, Amount = Per cent x Base.

It is possible, however, that the words "is" and "of" may be bothering you. They are words that indicate the symbols "=" and "x." In other words, A = % x B is usually written "A is (some %) of B" or "What is (some %) of B?"

Here is an example for you.

What is 3% of 25?

A = 3% x 25 = .03 x 25 = .75.

Turn to page 158 and continue.

Okay.

Now work this problem.

___ is 5% of 20.

(a) 1 Turn to page 136

(b) 4 Turn to page 152

(c) 10 Turn to page 163

You seem to be having your problems.

Go to page 123 and read the material carefully and study the example. Then proceed from there.

Turn to page 123.

Good! 122 2/9% is <u>one</u> of the correct answers.

Did you notice that 122.22% was a rounded off form of 122 2/9% and is also correct? Anyway, both of these answers were correct.

Now turn to page 145 and continue.

Incorrect. "Of" means "times," <u>not</u> divide!

Go back to page 156 and take a look at the problem again. Your answer should make good common sense.

Now be careful and work the problem again.

Turn to page 156.

Incorrect.

You failed to multiply by the number that changes any number into a per cent. What is that number? 100%, of course. Here's the next problem, but be more careful this time.

6 2/11 = ___%.

(a) 18.18 Turn to page 151

(b) 618.18 Turn to page 153

(c) 61.82 Turn to page 150

Your answer is incorrect.

The basic idea is that an "Amount" is equal to some "percentage" times a number of a "Base." The key words in the question are "is" and "of." "Is" indicates an equality while "of" stands for the multiplication symbol.

EXAMPLE: ? is 6% of 10 could be written as ? = 6% x 10. Therefore, ? = .06 x 10 = .6.

Here's a problem for you.

___ = 1% of 72.

(a) 7200 Turn to page 152

(b) .72 Turn to page 136

Whoops! You forgot to change 18% into <u>decimal</u> form before you did your work.

Return to page 165 and try the problem again.

Excellent! You are doing fine with these hard problems.

Here is your next problem. Be careful now as this problem is a little bit different from your last one.

144 is 18% of:

(a)	25.92	Turn to page 177
(b)	8	Turn to page 164
(c)	.00125	Turn to page 154
(d)	800	Turn to page 171

Incorrect.

Let's look at the correct solution to the problem.

5% of ___ is 3 is changed to the form 5% x B = 3

or, if you wish, 3 = 5% x B.

Step 1: B = 3/5% (solving equation for B)

Step 2: B = 3/.05 (change % to decimal form)

Step 3: B = 3/.05 = 300/5 = 60 (divide)

Let's try another problem like this one.

24 is 50% of:

(a)	.02083	Turn to page 181
(b)	12	Turn to page 173
(c)	48	Turn to page 172

Your answer is incorrect.

Let's look at how problems of this type should be worked. Consider the example: 6 is 40% of ___.
This should be written as:

Step 1: 6 = 40% x B

Step 2: B = 6/40% (change to equivalent form for solving)

Step 3: B = 6/40% = 6/.4 = 60/4 = 15.

Try this one.

9 is 75% of ___.

(a) 6.75 Turn to page 170

(b) 12 Turn to page 183

Sorry, but you forgot what divides what.

Return to page 177 and read the explanation again.

Then continue from there.

Good! Your answer is correct.

Work this problem.

What is 20% of .15?

(a)	.03	Turn to page 165
(b)	.3	Turn to page 156
(c)	.75	Turn to page 174
(d)	1.33	Turn to page 157

You seem to be having trouble solving equations of the form a = bc.

Go to Unit 14 and practice the method for solving equations of this type. Then return to page 145 of this unit.

Go to Unit 14.

That's correct!

Let's continue.

5% of ___ is 3.

(a) .15 Turn to page 191

(b) 60 Turn to page 188

(c) .0167 Turn to page 166

Good! That is the correct answer.

Here is your next problem.

12 1/2% of ___ is 3.

(a) .375 Turn to page 180

(b) 24 Turn to page 188

(c) .04167 Turn to page 181

Whoops!

For the equation A = % x B we find that B = A/%
is an equivalent form and that B = %/A is NOT.

Return to page 166 and be a little more careful.

You're working this problem incorrectly.

Go to page 145 and read the explanation again. Then continue from there.

Turn to page 145.

Wrong answer.

Which equivalent form of A = % x B are you using to solve for your unknown per cent?

(a) % = A x B Turn to page 194

(b) % = B/A Turn to page 192

(c) % = A/B Turn to page 184

Incorrect.

What equivalent form of A = % x B are you using?

Remember you're solving for %.

Return to page 186 and try again.

You missed that one, huh! Well, let's take a closer look at this type of problem.

First of all, what were we solving for? The problem was "144 is 18% of ___." Notice that the "%" is given and that the "amount" is given. Therefore, we want to find the "Base" or B from the general equation A = % x B.

To solve for B, we take A = % x B and change it to the equivalent form of B = A/%. Thus B is found by dividing the <u>amount</u> by the <u>percentage</u>.

For the problem 144 is 18% of ___, we solve like this:

B = 144/18% = 144/.18 = 14400/18 = 800.

Turn to page 178 and continue.

Okay.

Try this problem.

6 is 40% of:

(a) 2.4 Turn to page 167

(b) .0667 Turn to page 168

(c) 15 Turn to page 183

Your answer is incorrect.

Go to page 192 for a detailed explanation.

Your answer is incorrect. Let's look at this example.

12 1/2% of B = 3 is solved by writing it in the equivalent form of B = 3/12 1/2%.

I'll give you another chance.

8 is 80% of:

(a) 10 Turn to page 172

(b) 6.4 Turn to page 167

Your answer is incorrect. Let's look at this example.

12 1/2% of B = 3 is solved by writing it in the equivalent form of B = 3/12 1/2%.

I'll give you another chance.

8 is 80% of:

(a) 10	Turn to page 172
(b) 6.4	Turn to page 167

That answer is correct!

Continue by solving this problem.

What per cent of 60 is 1.2?

(a) 2% Turn to page 196

(b) 5% Turn to page 190

(c) 72% Turn to page 186

Correct!

Let's continue.

37 1/2% of ___ is 12.

(a) 32 Turn to page 171

(b) 4.5 Turn to page 167

(c) .03125 Turn to page 187

Correct!

Let's continue.

What per cent of 16 is 6?

(a) 96% Turn to page 197

(b) 26 2/3% Turn to page 175

(c) 37 1/2% Turn to page 182

Whoops! You divided incorrectly.

Return to page 192 and reread the material again carefully. Then continue from there.

Incorrect. Here is how the problem is worked.

Step 1: ___?___ % = 1.2/60 (equivalent form of A = % x B)

Step 2: ___?___ % = .02 (change fraction to a decimal)

Step 3: ___?___ % = 2% (change decimal to per cent)

Here's your next problem.

1.5 is ___% of 6.

(a) 40 Turn to page 176

(b) 9 Turn to page 194

(c) 25 Turn to page 189

Sorry! You divided incorrectly.

Go back to page 183 and try again.

Your answer is correct! You're doing well.

Let's continue with this problem. Be careful, it's a little bit different.

5 is ___% of 10.

(a)	200	Turn to page 192
(b)	50	Turn to page 182
(c)	20	Turn to page 179

Correct!

Here's your next problem.

___% of 12 is 7.5.

(a) 62 1/2% Turn to page 196

(b) 90% Turn to page 194

(c) 16% Turn to page 195

Incorrect. Here is how the problem is worked.

Step 1: ___?___ % = 1.2/60 (equivalent form of A = % x B)

Step 2: ___?___ % = .02 (change fraction to a decimal)

Step 3: ___?___ % = 2% (change decimal to a per cent)

Here's your next problem.

1.5 is ___% of 6.

(a) 40 Turn to page 176

(b) 9 Turn to page 194

(c) 25 Turn to page 189

Incorrect.

Let's look at the correct solution to the problem.

5% of ___ is 3 is changed to the form 5% x B = 3

or if you wish, 3 = 5% x B.

Step 1: B = 3/5% (solving equation for B)

Step 2: B = 3/.05 (change % to decimal form)

Step 3: B = 3/.05 = 300/5 = 60 (divide)

Let's try another problem like this one.

24 is 50% of:

(a)	.02083	Turn to page 181
(b)	12	Turn to page 173
(c)	48	Turn to page 172

Your answer was incorrect. Let's look at this problem in detail. First of all, you should have noticed that we are looking for per cent. Therefore, we use an equivalent form of A = % x B to solve for %. This equivalent form will be % = A/B. [If you don't see how that formula was derived from A = % x B, you should review solutions of a = bc from Unit 14.]

Now using the formula that per cent = amount/base, we take a problem (5 is ___% of 10) and write it in this form. You should then have % = 5/10. Solving, you get % = 5/10 = .5 = 50%.

Okay, here is your next problem.

3 is ___% of 5.

(a) 15 Turn to page 197

(b) 16.67 Turn to page 185

(c) 60 Turn to page 184

You seem to be having trouble finding what per cent one number is of another. Go to Unit 14 and review solutions of a = bc. Then return to page 145 of this unit.

Turn to Unit 14.

Incorrect. This problem is NOT solved by the operation of multiplication.

Looking at our general formula of A = % x B, we see that we only multiply when we are looking for the "amount" or A.

Let's look at this example problem step by step.

3 is ___% of 5.

Step 1: ___? % = 3/5 [We use the formula % = A/B (see page 145 if you don't understand) an equivalent form of A = % x B].

Step 2: ___? % = .6 (change fraction to decimal form)

Step 3: ___? % = 60% (change decimal to per cent)

Now you try this problem.

18 is ___% of 24.

(a) 75 Turn to page 189

(b) 133 1/3 Turn to page 197

Wrong answer.

Which equivalent form of A = % x B are you using to solve for your unknown per cent?

(a) % = A x B Turn to page 194

(b) % = B/A Turn to page 192

(c) % = A/B Turn to page 184

Excellent! You are doing fine work.

Now we are going to mix up the last section of problems that you have been working to see if you can apply the correct equivalent form of A = % x B and work the problem out for the correct answer.

Read each problem carefully now and decide whether to use A = % x B, % = A/B, or B = A/%. Then work the problem.

Here is your next problem.

40% of ? is 180.

(a) 72	Turn to page 206
(b) 222	Turn to page 203
(c) 450	Turn to page 210

Your answer is incorrect.

You should know that we are using an equivalent form of A = % x B to solve for an unknown per cent.

Now let me ask you, what is this equivalent form?

(a) % = A x B — Turn to page 193

(b) % = A/B — Turn to page 184

(c) % = B/A — Turn to page 200

That's correct!

Try this one.

What % of 4 is 24?

(a) 600% Turn to page 219

(b) 16 2/3% Turn to page 204

(c) 6% Turn to page 205

You seem to be having trouble solving problems for the Base or B part.

Return to page 177 and study the material there. Then continue the unit by working the problem on page 178.

Turn to page 177.

You seem to be having trouble finding what per cent one number is of another.

Go to Unit 14 and review solutions of a = bc. Then return to page 145 of this unit.

Go to Unit 14.

Wrong answer.

You're not concentrating. Remember, you must decide the answers to the following questions first.

Question 1: What am I solving the problem for?

Question 2: What equivalent form of A = % x Base do I use?

Then work the problem. Return to page 211 and try again.

Okay, % = 16/40 is correct!

Let's try to work this problem using one of the equivalent forms of A = % x Base.

16 = ___% x 40.

(a) 64 Turn to page 214

(b) 40 Turn to page 219

(c) 22 1/2 Turn to page 213

Your answer is incorrect. Use the equivalent form B = A/% to solve this problem. Let's look at the steps involved in solving 40% of ___ is 180.

Step 1: B = 180/40% (correct equivalent form)

Step 2: B = 180/.4 (change per cent to decimal)

Step 3: B = 180/.4 =1800/4 = 450 (divide)

Now try this one.

38 is 5% of:

(a) 76 Turn to page 198

(b) 131.5789 Turn to page 207

(c) 19 Turn to page 208

What? Let's pick a reasonable answer.

Surely you know that 16 2/3% or 1/6 of 4 cannot be 24. Return to page 198 and work the problem again.

Incorrect. You should have gotten 600% for your answer. What were you solving for?

To find %, we use the equivalent form % = A/B.
Then % = 24/4 = 6/1 = 600%.

Try this problem.

6.75 is ___% of 18.

(a) 121.5 Turn to page 214

(b) 23 1/3 Turn to page 215

(c) 37 1/2 Turn to page 209

Your answer is incorrect. Use the equivalent form B = A/% to solve this problem. Let's look at the steps involved in solving 40% of ___ is 180.

Step 1: B = 180/40% (correct equivalent form)

Step 2: B = 180/.4 (change per cent to decimal)

Step 3: B = 180/.4 = 1800/4 = 450 (divide)

Now try this one.

38 is 5% of:

(a)	76	Turn to page 198
(b)	131.5789	Turn to page 207
(c)	19	Turn to page 208

Incorrect.

The most important step is deciding which equivalent form of A = % x B is needed to obtain a solution for the problem. Let's see if I can give a clue on how to get the correct equivalent form. First of all, we take the general form A = % x B and note that this formula is used to solve for A. This is the only formula that you multiply two numbers (% and B) to get your answer.

What about solving for B or per cent? For both of these formulas we will DIVIDE. If we are solving for B, divide <u>by</u> %. If we are solving for per cent, DIVIDE <u>by</u> B.

Look at it this way:

If we want B, then A = (%) x B or A/% = B.

If we want %, then A = % x (B) or A/B = %.

It's not so hard, is it?

Continued on next page

Try this problem, then.

60% of ___ is 9.

(a) 54 Turn to page 199

(b) 15 Turn to page 198

Incorrect.

The most important step is deciding which equivalent form of A = % x B is needed to obtain a solution for the problem. Let's see if I can give a clue on how to get the correct equivalent form. First of all, we take the general form A = % x B and note that this formula is used to solve for A. This is the only formula that you multiply two numbers (% and B) to get your answer.

What about solving for B or per cent? For both of these formulas we will DIVIDE. If we are solving for B, divide <u>by</u> %. If we are solving for per cent, DIVIDE <u>by</u> B.

Look at it this way:

If we want B, then A = (%) x B or A/% = B.

If we want %, then A = % x (B) or A/B = %.

Continued on next page

It's not so hard, is it?

Try this problem, then.

60% of ___ is 9.

(a) 54 Turn to page 199

(b) 15 Turn to page 198

Your answer is correct!

Here is your next problem.

What % of 40 is 16?

(a) 64% Turn to page 214

(b) 22 1/2% Turn to page 218

(c) 40% Turn to page 219

Very good! 450 is the correct answer.

Let's continue.

What per cent of 4 is 24?

(a)	600%	Turn to page 219
(b)	16 2/3%	Turn to page 212
(c)	6%	Turn to page 205

Okay! % = A/B is correct.

Now let's work a problem using one of the equivalent forms of A = % x B.

33 1/3% of 45 is:

(a)	135	Turn to page 201
(b)	15	Turn to page 198
(c)	7.4074	Turn to page 207

Incorrect. You should have gotten 600% for your answer. What were you solving for?

To find %, we use the equivalent form % = A/B.
Then % = 24/4 = 6/1 = 600%.

Try this problem.

6.75 is ___% of 18.

(a) 121.5 Turn to page 214

(b) 23 1/3 Turn to page 215

(c) 37 1/2 Turn to page 209

Whoops! You forgot the answer you obtained on page 218. Pages 218 and 202 are related to each other.

Reread page 218 and your answer to page 218. Then work the problem on page 202 again.

Wrong answer. We do <u>not</u> solve this type of problem using the operation of multiplication. If we look at the general formula of A = % x Base and know that we are solving for %, we can obtain our equivalent form by:

(a) dividing both sides by B and getting % = A/B
Turn to page 211

(b) dividing both sides by A and getting % = B/A
Turn to page 200

(c) multiplying A times B and getting % = A x B
Turn to page 193

Come now.

What equivalent form of A = % x B did you use?

(a) % = A x B Turn to page 214

(b) % = B/A Turn to page 192

(c) % = A/B Turn to page 205

Correct!

Let's continue with this problem.

What is 13% of 3?

(a) .39 Turn to page 228

(b) 39 Turn to page 221

(c) 4 1/3 Turn to page 223

Your answer is incorrect.

Which equivalent form of A = % x B are you using to solve this problem?

(a) B = A/% Turn to page 222

(b) A = % x B Turn to page 233

(c) % = A/Base Turn to page 234

Your answer is incorrect.

What are you solving for? Per cent, right?

Okay then, what equivalent form will the problem be in?

(a) per cent = 16/40 Turn to page 202

(b) per cent = 40 x 16 Turn to page 214

(c) per cent = 40/16 Turn to page 200

Your answer is correct!

Try this one.

75% of 360 is:

(a) 27 Turn to page 224

(b) 480 Turn to page 229

(c) 270 Turn to page 228

Incorrect.

What are you solving for? The "Amount" or "A," right? Okay then, the formula we are using is Amount = % x Base.

Now what is 20% of 15?

(a) 1 1/3 Turn to page 225

(b) 3 Turn to page 216

Whoops! You made a careless mistake.

Return to page 216 and correct your error.

Incorrect.

A money problem where we want to find interest earned belongs to the formula i = prt, where interest equals the principal times the rate times the time.

Applying this to our formula of A = % x Base, we find that the interest is the same as the _____ in our formula.

(a) Amount — Turn to page 230

(b) Base — Turn to page 231

Wait a minute!

We should be using an equivalent form of A = % x B to solve for A.

Writing our problem (what is 13% of 3?) in that form, we get:

(a) A = 13%/3 Turn to page 220

(b) A = 3/13% Turn to page 226

(c) A = 3 x 13% Turn to page 216

Your answer is incorrect.

Here is how the problem, 75% of 360 is ___, is worked.

Step 1: A = 75% x 360 (correct equivalent form which in this case is A = % x B)

Step 2: A = .75 x 360 (change the percentage to decimal form)

Step 3: A = $7.35 (multiply)

Try this problem.

20% of 15 is:

(a)	75	Turn to page 220
(b)	13 1/3	Turn to page 227
(c)	3	Turn to page 216

You seem to be having trouble solving percentage problems of this type. Return to page 157 and study the material there. Then continue by working the problem on page 158.

Turn to page 157.

Incorrect.

What are you solving for? The "Amount" or "A," right? Okay, then, the formula we are using is Amount = % x Base.

Now what is 20% of 15?

(a) 1 1/3 Turn to page 225

(b) 3 Turn to page 216

Incorrect.

What are you solving for? The "Amount" or "A," right? Okay, then, the formula we are using is Amount = % x Base.

Now what is 20% of 15?

(a) 1 1/3 Turn to page 225

(b) 3 Turn to page 216

Very good!

Here is a thought problem for you to figure out. Now don't become confused. It is worked just like the others you have worked. Ready?

Okay, here goes.

If Shari Brown put $135.00 in a savings account at 5 1/4% interest per year, what amount would she earn in interest in one year's time?

(a)	$7.35	Turn to page 235
(b)	$25.71	Turn to page 230
(c)	$2.57	Turn to page 217

Your answer is incorrect.

Here is how the problem, 75% of 360 is ___, is worked.

Step 1: A = 75% x 360 (correct equivalent form, which in this case is A = % x B)

Step 2: A = .75 x 360 (change the percentage to decimal form)

Step 3: A = $7.35 (multiply)

Try this problem.

20% of 15 is:

(a) 75 Turn to page 220

(b) 13 1/3 Turn to page 227

(c) 3 Turn to page 216

Your answer is incorrect.

Which equivalent form of A = % x B are you using to solve this problem?

(a) B = A/% Turn to page 222

(b) A = % x B Turn to page 233

(c) % = A/Base Turn to page 234

Sorry, wrong answer.

Per cent times a base gives us tax or interest. Thus, we use the formula A = % x B.

Now look at this problem.

John bought a motorcycle for $432.00. He paid a state sales tax of 5%. How much money did he pay on sales tax?

Now to solve this problem, we should have the equation:

(a) Tax = $432/5% Turn to page 225

(b) Tax = 5% x $432.00 Turn to page 236

(c) Tax = 5%/$432.00 Turn to page 220

Sorry, wrong answer.

Per cent times a base gives us tax or interest.

Thus, we use the formula A = % x B.

Now look at this problem.

John bought a motorcycle for $432.00. He paid a state sales tax of 5%. How much money did he pay on sales tax?

Now to solve this problem, we should have the equation:

(a)	Tax = $432/5%	Turn to page 225
(b)	Tax = 5% x $432.00	Turn to page 236
(c)	Tax = 5%/$432.00	Turn to page 220

That's correct!

Now let's apply one of the equivalent forms to obtain a solution to this problem.

John bought a motorcycle for $432.00. The state sales tax on the motorcycle was 5%. How much did John pay for sales tax?

(a)	$86.40	Turn to page 231
(b)	$21.60	Turn to page 235
(c)	$8.64	Turn to page 232

Sorry, wrong formula.

Try again. Return to page 230.

Excellent work! You have successfully completed this Unit. Let's look at what you have learned.

1. You have learned how to change fractions and decimals to per cent form.

2. You have learned how to change percentage to decimal or fractional form.

3. You have learned how to solve percentage problems of the form "Amount = per cent x Base" for any one part given the other two.

Now you are ready for a test on this Unit. Tell your teacher that you have finished.

Okay. Let's try the problem again.

John bought a motorcycle for $432.00. The state sales tax is 5%. How much did John pay in sales tax?

(a) $2.16 Turn to page 237

(b) $86.40 Turn to page 232

(c) $21.60 Turn to page 235

Whoops!

Make a tiny error in your work. Go back to page 236 and try again.

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CAI MATHEMATICS

TEST QUESTIONS

UNIT 15 - PERCENTAGE

Directions: The correct answers will always be expressed in lowest terms.

1. 2/5 = _____%

   a) 2

   b) 20

   c) 40

2. Write 5% as a fraction

   a) 5/100

   b) 5

   c) 1/20

3. Write .03 as a percent

   a) .03%

   b) 3/10%

   c) 3%

4. What decimal is equal to 35%

   a) .35

   b) 3.5

   c) 7/20

5. 36 is 25% of

   a) 9

   b) 144

   c) 72

6. 300/100 = ____ %

   a) 3

   b) 300

   c) .03

7. 150% is the fraction

   a) 3/2

   b) 15

   c) 4/5

8. What percent is equal to 7.4?

   a) 7.4 %

   b) 74%

   c) 740%

9. What decimal is equal to 137% ?

   a) 1.37

   b) .0137

   c) 137.

10. 10% of ___ is 3

   a) 30

   b) 33 1/3

   c) .3

11. The fraction 1 2/3 is equal to which of the following percents.

   a) 1 2/3%

   b) .01 2/3%

   c) .0133%

12. 2 1/2% written as a fraction is

   a) 1/40

   b) 2 1/2

   c) 1/4

Unit 15 (continued)

13. .1625 = ___ %

    a) 11.5/8

    b) 1625

    c) 16 1/4

14. 1/2% is equal to which of the following?

    a) .5

    b) .005

    c) .02

15. 50% of 56 is

    a) 112

    b) 28

    c) 5.6

16. What percent is equal to 7/100 ?

    a) .07%

    b) 700%

    c) 7%

17. 1 2/9% and the fraction ____ are equal

    a) 11/900

    b) 11/9

    c) 90/11

18. The decimal .01 is equal to which of the following?

    a) 1/10

    b) 1%

    c) 100%

Unite 15 (continued)

19. The best decimal answer for 7 2/9% is

a) .0722

b) 7.2222

c) .008

20. 2 1/4% of 100 is

a) 225

b) 4/9

c) 2.25

21. 21/35 = _____ %

a) 17

b) 21

c) 60

22. 33% is the fraction

a) 33/100%

b) 1/3

c) 3 3/10

23. .05375 = _____ %

a) 53 3/4%

b) 5 3/8%

c) 5 3/4%

24. 13 1/2% written as a decimal is

a) 13.5

b) .135

c) 1.35

25. What percent of 24 is 4?

a) 600%

b) 9.6%

c) 16 2/3%

ANSWER SHEET

UNIT 15 - PERCENTAGE

1. c
2. c
3. c
4. a
5. b
6. b
7. a
8. c
9. a
10. a
11. b
12. a
13. c
14. b
15. b
16. c
17. a
18. b
19. a
20. c
21. c
22. a
23. b
24. b
25. c

To the instructor: The above problems are related to the following objectives:

OBJECTIVE 1 : Questions 1,6,11,16,21

OBJECTIVE 2 : Questions 2,7,12,17,22

OBJECTIVE 3 : Questions 3,8,13,18,23

OBJECTIVE 4 : Questions 4,9,14,19,24

OBJECTIVE 5 : Questions 5,10,15,20,25